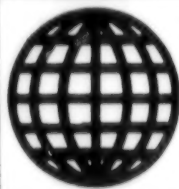


JPRS-UST-93-005  
25 October 1993



**FOREIGN  
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# ***JPRS Report***

# **Science & Technology**

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***Central Eurasia:  
Science & Technology Policy***

# Science & Technology

## Central Eurasia: Science & Technology Policy

JPRS-UST-93-005

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25 October 1993

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**Minutes of the Russian Academy of Sciences  
March 1993 General Meeting**

937A0147A Moscow VESTNIK ROSSIYSKOY  
AKADEMII NAUK in Russian No 7, Jul 93 pp 580-586

[Unsigned article: "Annual General Meeting of the Russian Academy of Sciences. First Year of Work in the Period of Economic Transition: Minutes of the RAN Annual General Meeting"]

[Text] This annual general meeting worked just one day, on 24 March 1993, rather than two days as in the past. The presidium of RAN [Russian Academy of Sciences] decided to adopt this new arrangement, whereby the participants first met for two days in sessions of specialized RAN sections and had an ample opportunity to discuss in detail the vital issues in the activities of the academy and the prominent results of research. The general meeting then discussed only those issues relevant to the entire community of the academy's scientists.

Before opening the meeting, the president of RAN, Yu. N. Osipov, paid homage to the members deceased since the time of the preceding general meeting, who died on the following dates:

8 April 1992: Academician Lev Nikolayevich Koshkin, a famous designer of automated systems and rotor production lines;

18 April 1992: Corresponding member Agniya Vasilyevna Desnitskaya, a prominent linguist;

25 April 1992: Academician Yuriy Borisovich Kobzarev, a prominent scientist in the field of radiophysics;

18 May 1992: Academician Georgiy Aleksandrovich Nikolayev, an outstanding scientist in the field of welding;

9 June 1992: Corresponding member Petr Filimonovich Shvetsov, a prominent hydrogeologist;

17 June 1992: Corresponding member Anatoliy Aleksandrovich Petrov, a prominent specialist in organic chemistry;

22 July 1992: Academician Valeriy Leonidovich Barsukov, an outstanding geochemist;

24 July 1992: Academician Gavriil Abramovich Ilizarov, a world renowned specialist in reconstructive surgery;

26 July 1992: Corresponding member Valeriy Konstantinovich Antonov, a prominent enzymologist;

1 August 1992: Academician Aleksandr Aleksandrovich Imshenetskiy, a famous microbiologist;

2 September 1992: Academician Veniamin Pavlovich Chebotayev, a prominent scientist in the field of optics and laser physics;

8 October 1992: Corresponding member Grigoriy Viktorovich Gershuni, a well-known physiologist and specialist in physiology of sensor systems;

17 October 1992: Academician Avenir Arkadyevich Voronov, a leading scientist in automatic control theory;

30 October 1992: Corresponding member Velentin Konstantinovich Ivanov, a famous mathematician;

1 November 1992: Corresponding member Aleksandr Markovich Moiseenkov, prominent organic chemist;

4 November 1992: Corresponding member Lev Pavlovich Zonenshain, a leading scientist in ocean floor tectonics;

8 November 1992: Corresponding member Nikolay Dmitrievich Ustinov, a specialist in applications of quantum electronics;

11 November 1992: Corresponding member Vasilii Fedorovich Evstratov, an expert in chemistry of high molecular compounds, for many years associated with the tire industry;

6 December 1992: Corresponding member Isay Izrailevich Gurevich, a prominent scientist in experimental nuclear physics, who made an important contribution to solution of the nuclear energy problems in Russia;

27 December 1992: Corresponding member Kirill Andreyevich Bolshakov, a prominent specialist in technology of rare and disseminated elements;

22 January 1993: Academician Nikolay Sergeyevich Enikolopov, prominent scientist in chemical physics and synthetic polymers;

5 February 1993: Corresponding member Vyacheslav Petrovich Yelyutin, outstanding expert in metallurgy and metal engineering and a public servant, who was the Minister of Higher Education of the USSR for more than 30 years;

12 February 1993: Academician Aleksandr Ivanovich Pavlovskiy, an outstanding scientist in nuclear technology;

17 February 1993: Corresponding member Vatslav Leonovich Kretovich, a prominent specialist in plant biochemistry;

21 February 1993: Corresponding member Lev Aleksandrovich Dmitriyev, a prominent literary historian, specialist in ancient Russian literature;

28 February 1993: Academician Ivan Vladimirovich Tananayev, a famous chemist;

11 March 1993: Academician Yuriy Alekseyevich Pisarev, a prominent expert in the history of Balkan nations.

The meeting paid tribute to their memory by observing a moment of silence.

In his opening remarks, the president of RAN, Yu. S. Osipov,<sup>1</sup> spoke of the key results of scientific research conducted by the institutes of the academy and the salient points in the life of the scientific community. A critical situation has evolved at scientific centers of RAN in Kazan and Ufa. The RF Ministry of Finance stopped financing these centers because their respective regions have refused to contribute to the federal budget. The leadership of the academy is compelled to eke out funds from its own scarce budget to support these centers. The Russian Academy of Sciences believes that basic scientific research should not be under joint purview of federal and local authorities. It ought to be financed from a centralized source.

The question of the ownership of RAN assets has yet to be decided. The president voiced his opinion concerning the academy property, which in fact is supported by many members: the property of the academy should not be owned by individuals (including members of RAN), the presidium, or scientific groups. This property includes everything used by the academy and it should be passed on to future generations. Regrettably, this view is not shared by the RF State Committee on the Administration of State Property.

According to the president, the financial position of the academy has slightly improved. At the end of last year it received a considerable subsidy from the government. However, if the rate of inflation continues to rise, these funds will only be enough to pay meager salaries. One cannot even think of buying equipment, chemicals or instruments. Nevertheless, the president noted that the Russian Academy of Sciences is one of the few remaining organizations which receive steady government financing.

A report "On Activities of the Presidium of the Russian Academy of Sciences and the Implementation of Decisions Adopted by General Meeting of the Academy During the Reported Period" was presented by academician I. M. Makarov, chief learned secretary of RAN. He noted that the presidium took active steps to protect the property of the academy. Unfortunately, attempts to privatize certain facilities of the academy in some cases were successful. The presidium paid special attention to financing of scientific research. Aside from government budget, additional sources were used: government scientific and technical programs, the Russian Foundation for Fundamental Research, and a program for joint activities of Moscow city government and the Russian Academy of Sciences. RAN has set up its first bank: the academy now holds the controlling block of shares of Rosakadembank. I. M. Makarov believes that, instead of a financing plan, the academy ought to develop a budget to implement its financial policy. The budget should cover all sources of revenue, including additional funds derived from the use of properties and from Rosakadembank activities.

The chief learned secretary of RAN discussed the issues of academy personnel, capital construction, hostel and

housing facilities, health services, and international contacts. He specially noted the work of RAN publication services, whose success depends on the contributions of all academy members.

Fourteen speakers took part in debates on the main points of the report. Many of them discussed RAN financing.

Academician K. I. Zamarayev, director of the Institute of Catalysis of the RAN Siberian Department, does not share the optimistic view of the academy management regarding improvements in the financing of basic research. With the current rate of inflation, it is difficult to gauge the growth of financing. K. I. Zamarayev supported a proposal submitted in the December 1992 general meeting: basic scientific research should be financed as a special item to be budgeted as a percentage of GNP. According to estimates cited by V. N. Sobolev, chairman of the council of the trade union of RAN employees, the budget allocations for science as a GNP share has decreased in recent years by more than two thirds. This indicates not only deterioration of the nation's economy, but also a declining prestige of scientific research. According to academician G. A. Mesyats, the academy's budget (in current dollar rate of exchange) is smaller than the budget of an average U.S. university, and the material and technical infrastructure is in a pitiful state.

G. A. Mesyats, chairman of the RAN Ural Department, reported that for the first time oblasts and autonomous republics in the Ural region included an item for "science" in their 1992 budgets. In 1993, the Sverdlovsk oblast administration assigned for science some 200 million rubles in its budget. Assistance to scientists is given by local government agencies in Perm and Orenburg oblasts and in the Komi republic.

By contrast, the relationships between the administrations of the Primorye Krai and the Far East Department of RAN are not faring as well. According to the department chairman, academician G. B. Yelyakov, the lesser council of the krai has agreed to allow the institutes to pay preferential tariffs for utilities. The council also promised to assign \$100,000 to the academy department for purchase of spare components for scientific instrumentation. However, the executive branch of the krai government has refused to carry out these resolutions of the lesser council.

Basic financing by the state is of course the main source of support to science. However, until recently science was receiving considerable funds from industry on the basis of contracts. At present, it is not easy to obtain money from industrial enterprises. Academician K. I. Zamarayev proposed that this should be done by a well formulated tax policy. Norms for the use of raw materials and energy and permissible levels of toxic emissions per a unit of each type of product have been defined and generally acknowledged in the advanced nations of the world. Most Russian enterprises fail to comply with

these norms. If the government gradually introduces penalties in proportion to excessive levels violating these norms, the money could then be channeled into promotion of science.

Another potential source of financing is commercial structures. The academy now has about 500 of them. However, as noted by academicians I. M. Makarov, G. A. Mesyats and K. I. Zamarayev, the actual assistance to scientific research provided by them is negligible. Yet, these commercial entities use equipment and office space of academy's institutions. On the other hand, K. I. Zamarayev noted that only major industrial firms, such as Shell or Mitsubishi, could afford to maintain research institutes on a scale typical for the Russian academy.

A different opinion concerning commercial entities was voiced by academician V. E. Panin, the director of the Institute of Physics of Strength and Material Science of the RAN Siberian Department. Twenty small enterprises that have been created use the equipment and space of the academy's institute. Although they indeed contribute little revenue to the institute, they help it to retain its staff of employees and provide additional work places. These small enterprises make an effort to package science-intensive products as a commodity and sell them in markets which are all but nonexistent. A Russian Materials Science Center has been set up at the institute, which includes research and educational facilities and a holding center. The latter supervises the operations of 20 small enterprises which produce commodities for market. The Materials Science Center receives funds from the RF Ministry of Science and the Committee for Higher Education.

Academician V. E. Panin believes that such federal science centers should be set up on the basis of academy institutes. This view is shared by academician K. I. Zamarayev. However, RAN president Yu. S. Osipov fears that creation of federal scientific centers will lead to the breakdown of the traditional organization of basic scientific research in Russia. He suggested that the status of a federal center be granted only to those institutions which the academy will be able to spin off.

The chairman of the Russian Foundation for Fundamental Research, academician A. A. Gonchar, described the results of the first contest of innovative scientific projects, held in January 1993. The foundation received more than 20,000 grant applications. The applications had to be processed by experts within 6 weeks to be able to utilize the funds assigned to the foundation in the first quarter of 1993. For expert evaluation, the foundation board invited scientists active in their respective fields, most of whom, regrettably, were Moscow residents. Based on the results of this evaluation, some 3,000 projects received grants. Doctors and candidates of science made up a considerable number of contest winners. The grants in the first quarter ranged from 100,000 to 1.25 rubles. A. A. Gonchar stressed that the foundation has limited resources (just 3% of allocations for science) and is unable to offer broad assistance to institutes or

finance foreign travel of individual scientists. In its spending on publications, the foundation will give preference to journals produced by RAN.

Academician N. N. Nikolskiy expressed surprise that scientific boards of RAN, which include representatives of academy institutes and university and industry scientists, were not invited to take part in the expert analysis of these projects. O. M. Nefedov believes that scientific boards represent what is in fact an existing infrastructure for expert evaluation. A. A. Gonchar agreed that eventually scientific boards will take part in such expert assessments, but said that within the six weeks available for this effort it would have been impossible to determine, for instance, which one of the more than 30 physics boards should conduct this work.

Participants in the meeting raised the issues of social security for scientists. In particular, they pointed out that the high level of education of RAN employees is not given proper credit in the Unified Wage Tariff Schedule. The presidium of RAN is now taking steps to improve these tariffs. In the interim, directors of the institutes may consider shifting to a contractual basis the positions of particularly talented individuals and pay them whatever they are worth. Academician K. I. Zamarayev believes that, in contract arrangements, an effort should be made to provide incentive to scientists who are highly creative, while at the same time increasing their responsibility for results. They should not only be paid well, but provided with appropriate working conditions, including supply of chemicals, materials, instrumentation and literature. After the contract system was introduced at the Institute of Catalysis, directed by K. I. Zamarayev, the flight of specialists abroad was stopped. Contracts are signed for at least five years.

The problem of property ownership, a crucial question in the academy's life, is yet to be resolved. Academician O. M. Nefedov, chairman of the RAN Commission on Property Ownership, reported that a decree of the Supreme Soviet has been drafted, which deals almost entirely with the ownership status of the academy. This document had an ill-starred fate: it was twice proposed for inclusion on the Supreme Soviet agenda, but both efforts failed. There is hope that it will be considered in the near future.<sup>2</sup>

This document prohibits privatization of enterprises, institutes and organizations in the sphere of scientific activities that belong to RAN framework. Objects of social infrastructure can be privatized only with the approval of the RAN presidium. The housing stock can be privatized according to the current legislation. The property of scientific institutions and their land are to be given to the academy for rent-free use. The scientific facilities of a particular historic or cultural value (the RAN is to compile the list of such facilities and submit it to the Supreme Soviet and the government) must be treated as a national asset.



The chairman of the council of the trade union of RAN employees, V. N. Sobolev, stressed the importance of properly defining the status of academy ownership. The property of the academy should not be a source of conflict, but an important auxiliary resource for solution of various social issues.

After the debates, the general meeting passed the final resolution. Since a detailed resolution "On Status and Prospects for Development of Scientific Research by the Russian Academy of Science" had been adopted last December, the resolution of the present meeting was brief. It approved the report of activity of the Russian Academy of Science for 1992 and recommended that the presidium in its future work take into consideration the suggestions and proposals presented in the current meeting.

Many questions (submitted in writing) were asked of the president and the chief learned secretary of RAN during the meeting. We cite the answers to some of them. One question concerned the salaries of the employees of the RAN presidium. I. M. Makarov replied that the unified wages tariff does not apply to presidium employees, just as it does not apply to the employees of government ministries. If the RAN presidium recommendation on a 50% increment to standard rate for salaries of individuals who have a scientific degree or title is adopted, their wages will be higher than what the employees of the presidium now earn. Answering the question about the status of the drafting of the law on the Russian Academy of Sciences and whether staffs of institutes will be involved in this effort, I. M. Makarov noted that contribution of any academy scientist to this work would be welcomed. The first draft of the law, which has already been approved by a commission of the Supreme Soviet, has been prepared under the leadership of academician V. N. Kudryavtsev. Several questions were asked concerning the property ownership of RAN. The chief learned secretary re-emphasized the importance of this problem, reminding the audience that a special RAN commission is engaged in this work. The destructive forces mentioned by I. M. Makarov in his report wish to transfer the property of the academy to individual institutes. If this happens, the academy may lose half of its institutes.

The president of RAN was asked for information on the presidium's plans concerning the use of its unique instruments the RATAN-600 radio-telescope and the 6-meter optical telescope in Northern Caucasus. Yu. S. Osipov believes that these instruments should be assigned the status of federal property as has already been done with the PIK research reactor in Gatchina; the construction of this reactor is nearing completion. The presidium is monitoring the situation with these instruments and will not allow them to be ruined. Academician A. S. Alekseyev asked whether the presidium has ideas for acquiring computers to support basic research and whether it has developed an amnesty policy for unlicensed use of software. Yu. S. Osipov replied that the

presidium does not have funds for a centralized purchase of computers and that institutes have been dealing with the issue on their own through their commercial structures. The academy's president believes that it would be more efficient to pool the funds of institutes and buy a large lot of computers. In that case, it will cost each institute less to buy this technology. As to an amnesty for unlicensed software use, the president noted that the question is still up in the air. There are signs that amnesty is under consideration and there is hope that parts of this software use will be legalized.

Participants in the meeting were then addressed by academician V. E. Sokolov. He called upon every member of the academy to take a stand for protection of Russia's wildlife. The Kalmyk population of saiga whose horns are used in oriental medicine is endangered. As much as 50 to 70% of the kabarga musk deer population has been destroyed. The kabarga male has a musk pouch, highly valued in the Orient. In the past year alone, 40 tiger hides have been sold abroad. Hunter falcons are being sold to Arab countries. The general meeting of RAN expressed its demand for putting an end to this plundering of Russia's wildlife.

The meeting then discussed organizational matters. According to RAN charter adopted in December 1992, the general meeting must determine the number of academy members. Election to the academy can be announced only after this is done. The last regular election took place in 1990 and, according to the charter, the next election should be held in 1993.

Academician A. A. Gonchar reported that, as of 15 March 93, the academy had a membership of 1,039, including 433 academicians and 606 corresponding members. If all vacancies are filled in the next election, the academy membership will reach 1,114. The RAN presidium suggested that the total membership should be 1,100. It also recommended (although this is not specified for in the by-laws) to limit the number of full academicians to 500 and corresponding members to 600. In 1993 the presidium, as planned, elected some foreign members to RAN. The meeting supported the organizational proposals of the presidium by a majority vote.

The meeting took place at the time of an intense constitutional crisis in the country. The president of RAN expressed concern on behalf of the meeting participants and some 200,000 employees of the academy for the fate of Russia and of science, noting that each individual is entitled to his own view of the current events. However, everybody understands that economy, science, and culture can thrive only in conditions of political and social stability, solid law and order and efficient cooperation of all branches of government. Yu. S. Osipov stated his confidence that most members of the academy support the reform currently under way in Russia and support the right of the popularly elected national president to raise the issue of popular confidence in him and to present his view of the system of government. There is no doubt that society will find a consensus and a mutually acceptable understanding of all aspects of the

principle of separation of powers and specific forms for interaction both at the center and locally. The RAN president stressed the academy's general support for a strong, enlightened and democratic government. A government of this kind will rely on science, culture, and education. As a professional organization, the Russian Academy of Sciences can support the President and the state. On the other hand, the academy should stay out of political games. Its basic purpose is to honestly perform its professional mission.

The final item on the agenda was the awarding of gold medals and prizes of the Russian Academy of Sciences.

In 1992 the following awards were given:

M. A. Lavrentyev gold medal: to academician Bogdan Vyacheslavovich Voitsekhovskiy, for scientific work in mathematics and mechanics;

A. M. Lyapunov gold medal: to academician Nikolay Nikolayevich Krasovskiy, for a series of works in stability theory and optimal control theory;

A. S. Popov gold medal: to corresponding member Vladimir Ivanovich Siforov, for a range of scientific works and inventions in radioengineering;

B. N. Petrov gold medal: to corresponding member Boris Yevseyevich Chertok, for a series of projects in automatic control of space and rocket systems;

F. A. Tsander gold medal: to academician Timur Magometovich Eneyev, for a series of works in the theory of motion and flight control for rockets and space vehicles;

I. P. Bardin gold medal: to academician Nikolay Pavlovich Lyakishev, for study of existing, and development of new, metallurgical processes;

D. N. Pryanishnikov gold medal: to Feliks Vikentyevich Yanishevskiy, doctor of agricultural sciences, for a series of works "Agro-chemical Principles for Improving the Efficacy and the Composition of Phosphorous-Containing Fertilizers and Nitrification Inhibitors";

V. N. Sukachev gold medal: to academician Aleksandr Sergeyevich Isayev, for a series of studies "Analysis of Interactions of Insects and Tree Plants in the System of a Forest Biogeocenosis";

L. S. Leibenzon gold medal: to corresponding member Aleksandr Ivanovich Gritsenko, for development of scientific principles of engineering processes in the exploitation of gas and gas-condensate fields;

N. V. Melnikov gold medal: to corresponding member Valentin Alekseyevich Chanturiya, for studies in comprehensive beneficiation of ores with complex composition;

V. M. Bekhterev gold medal: to Yakov Aleksandrovich Ponomarev, doctor of psychology, for a series of works in psychology of creativity, intelligence development and methodology of psychological research;

M. D. Millionshchikov prize: to Yevgeniy Borisovich Etingof, for leadership in the editorial group that published international yearbooks "Science and Humanity," "Hypotheses and Forecasts," science popularization books, essays about scientists and publications of bibliographic and theoretical studies in public promotion of science;

S. V. Kovalevsky prize: to academician Olga Aleksandrovna Ladyzhenskaya, for a series of studies "Attractors for Semigroups and Evolutionary Equations";

M. A. Lavrentyev prize: to corresponding member Sergey Konstantinovich Godunov, for monograph "Elements of Continuous Mechanics";

N. I. Lobachevsky prize: to academician Vladimir Igorevich Arnold, for the work "Normal Forms of Functions Near Singular Critical Points. Weyl groups  $A_n$ ,  $D_n$ , and  $E_n$  and Lagrangian singularities";

A. I. Maltsev prize: to Yuriy Leonidovich Yershov, for monograph "Numeration Theory";

A. A. Markov prize: to Gennadiy Ivanovich Arkhipov, doctor of physical-mathematical sciences, for a series of works "The Hilbert-Kamke Problem";

L. A. Artsimovich prize: to Vladimir Vladimirovich Alikayev, Yuriy Valentinovich Yesipchuk, candidate of physical mathematical sciences, and Kseniya Aleksandrovna Razumova, doctor of physical-mathematical sciences, for a series of studies "Plasma Heating and Current Generation by Electron Cyclotron Waves";

L. D. Landau prize: to Grigoriy Yefimovich Volovik, doctor of physical-mathematical sciences, and Vladimir Petrovich Mineyev, doctor of physical-mathematical sciences, for a series of works "Topology, Defects, and Superfluidity";

D. S. Rozdenstvenskiy prize: to Aleksandr Aleksandrovich Kaminskiy, doctor of physical-mathematical sciences, for a series of works "Optics and Spectroscopy of Laser Crystals";

I. E. Tamm prize: to Vladimir Iosifovich Petviashvili, doctor of physical-mathematical sciences, for a series of works "Turbulence and Current Eddy Structures in Plasma";

S. V. Lebedev prize: to corresponding member Yuriy Borisovich Monakov and corresponding member Sagid Raufovich Rafikov, (posthumously) for the series of studies "New Catalytic Systems and Ways to Improve Synthesis of Cis- and Transpolyenes";

P. A. Rebinder prize: to Naum Borisovich Uryev, doctor of chemical sciences, for a series of studies "Structure Formation and Rheology of Concentrated Dispersed Systems";

V. G. Khlopin prize: to academician Fedor Grigoryevich Reshetnikov, Ivan Vasilyevich Budayev, candidate of

technical sciences, and Mariya Grigoyevna Gurvich, for a series of studies "Physicochemical Investigations of Processes for Production of Uranium-235, Uranium-233 and Transuranium Elements in a Metal Form";

M. M. Shemyakin prize: to corresponding member Vladimir Fedorovich Bystrov (posthumously) and Aleksandr Sergeyevich Arsenyev, doctor of chemical sciences, for a series of studies "Investigations and Functions of Membrane Peptides and Proteins by NMR Spectroscopy";

L. S. Berg prize: to corresponding member Anatoliy Petrovich Andriyashev, for a series of studies "Ichthyofauna of the Arctic and Antarctic Regions (Taxonomy, Biogeography and Origins)";

K. I. Skryabin prize: to Mark Dmitrievich Sonin, doctor of biological sciences, for a series of studies in nematod fauna and systematics;

N. V. Tsitsin prize: to Mikhail Alekseyevich Mikhlin, doctor of biological sciences, for monograph "Intergeneric Hybridization of Cereal Grain Crops";

N. I. Shmalgauzen prize: to corresponding member Emiliya Ivanovna Vorobyeva, for a series of studies "Morphologic Evolution of Crossopterygii Fishes and the Origin of Land Vertebrates";

L. A. Orbeli prize: to Vitaliy Grigoyevich Kassil, doctor of medical sciences, for monograph "Nutritional Behavior in Ontogeny";

I. M. Sechenov prize: to academician of the Russian Academy of Medical Sciences Vladimir Sergeyevich Rusinov, for a series of studies on the role of dominant excitation foci in the formation of complex integrative brain activity;

N. P. Gorbunov prize: to academician Alexander Leonidovich Yanshin, Mikhail Abramovich Zharkov, doctor of geologic-mineralogic sciences, and Grigoriy Mikhailovich Dru'gov, for a series of studies "Substantiation and Discovery in Siberia of the World's Largest Nepa Potassium-Bearing Basin";

N. V. Melnikov prize: to Anatoliy Timofeyevich Kalashnikov, doctor of technical sciences, for studies in comprehensive development of iron ore deposit and creation of resource-saving technologies;

O. Yu. Shmidt prize: to Mikhail Yevgenyevich Artemyev, doctor of technical sciences, for a series of studies "Investigation of Lithosphere Isostasy";

F. O. Savarenskiy prize: to Nikolay Aleksandrovich Marinov, doctor of geologic-mineralogic sciences, Nestor Ivanovich Tolstikhin, doctor of geologic-mineralogic sciences (posthumously), and Lyusya Igor'evna Flerova, candidate of geologic-mineralogic sciences for the monograph "Hydrogeology of Europe" (in two volumes);

B. D. Grekov prize: to corresponding member Yaroslav Nikolayevich Shchapov, for monographs "Government and Church in Ancient Russia, XI-XIII centuries," "Royal Decrees and the Church in Ancient Russia, XI-XIV centuries," "Byzantium and the Traditional South Slavonic Legal System in Russia in XI-XIII Centuries," and also for publication of the historic documents "Decrees of the Princes of Old Russia, XI-XIV Centuries";

S. L. Rubinshtein prize: to Kseniya Aleksandrovna Abulkanova-Slavskaya, doctor of philosophical sciences, corresponding member Andrey Vladimirovich Brushlinskiy, and Mikhail Grigoryevich Yaroshevskiy, doctor of psychological sciences, for a series of studies on theory and history of psychology;

N. D. Kondratyev prize: to Viktor Meerovich Polterovich, doctor of economic sciences, and Gennadiy Markovich Khenkin, doctor of physical-mathematical sciences, for a series of studies "Diffusion of Innovations and Economic Growth";

A. S. Pushkin prize: to Yuriy Mikhailovich Lotman, doctor of philological sciences, for studies "Aleksandr Sergeyevich Pushkin: the Poet's Biography," and "Eugene Onegin: A. S. Pushkin's Novel: Commentary."

In closing the general meeting, the RAN president appealed to his colleagues to continue their joint cooperative endeavor.

#### Footnotes

1. The opening remarks of the RAN president, the report of the chief learned secretary and the full texts of remarks of the participants are published in the current issue of the journal.

2. The decree has been approved and is published in the present issue.

#### Key Mechanical Engineering Institutes Scattered Throughout CIS

937A0160A Moscow DELOVOY MIR  
in Russian 3 Sep 93 p 7

[Article by Doctor of Economic Sciences Valentin Sinko and Boris Volder, head of a department of the State Design Institute for the Planning of Machine Tool Building, Tool, and Abrasive Plants and Forging and Pressing Machinery Plants, under the rubric "Survey": "The Degradation of Science Is Turning Into Technical Backwardness"—first paragraph is DELOVOY MIR introduction]

[Text] The machine building complex of the Russian Federation includes 1,100 enterprises of nine sectors with a total of 3 million workers and 430 organizations, which perform research and development with a total of 187,400 scientific workers. The acceleration of the pace of scientific and technical progress and the extensive use



of innovations in production are one of the main factors of the rapid recovery of machine building from the crisis.

In the last two to three years substantial changes, which are connected with the disintegration of economic ties, the freeing of prices for industrial products, and the privatization of state property, have occurred in the scientific and technical potential of the Russian Federation. This has created uncertainty in the functioning of scientific research, planning and design, and technological institutes, special design bureaus, pilot plants, and data processing centers. These organizations constitute the so-called sectorial sector of science, which is responsible for the technical level of the production of machine building products.

It should be pointed out that the bulk of the scientific and technical potential of the former USSR is concentrated in Russia, but a number of most important directions of scientific research and development are being carried out by scientific organizations in other countries of the CIS, as well as in Georgia and the Baltic states. Thus, in the electrical equipment industry the scientific centers for transformer building, converter equipment, and small electric machines are located in Ukraine and Lithuania. In chemical and petroleum machine building after the disintegration of the USSR 19 scientific research institutes and special design bureaus remained outside the Russian Federation. In particular, the head organization for compressor building is located in Ukraine. In Russia none of the scientific research institutes is engaged in the development and improvement of gas blowers, on which the production of semiconductor instruments, rare earth materials, and equipment for power engineering of the agro-industrial complex and the gas and petroleum industry depends.

In the machine tool and tool building industry about 20 large scientific research institutes and special design bureaus are located outside the Russian Federation. In particular, VNIIdroprivod and VNIiredaktor (Ukraine) are engaged in the development of hydraulic drives and hydraulic control components, pneumatic actuators and pneumatic control components. The special design bureau in Minsk (Belarus) is developing power drives, reduction gears, and variable-speed drives; the special design bureau in Vitebsk (Belarus) is developing gear-grinding and tool-grinding machines. In instrument making nearly half of the scientific and design organizations of the former USSR are located outside the Russian Federation. A similar situation has also formed with respect to other sectors of machine building.

The conclusion may be unambiguous: The preservation of scientific production relations with the countries of the CIS, Georgia, and the Baltic states, as well as the change in the immediate future of the specialization of a number of scientific institutions for the purpose of implementing developments, which are lacking at

present in Russia, are the most important problem of the sectorial science of machine building of the Russian Federation.

The amount of allocations for scientific and technical work in Russian machine building in 1991 as compared with 1990 decreased by 9.6 percent; in 1992 with respect to 1991 the decrease of the amounts of allocations came to 20.1 percent. Today this destructive trend remains. A significant decrease of financing has occurred in the electrical equipment industry, in heavy, power, and transport machine building, in chemical and petroleum machine building, in road construction and municipal machine building and in the automotive industry, in tractor and agricultural machine building. The reduction is explained by the fact that financing on the part of enterprises has decreased significantly and budget allocations have been halted almost completely.

Undoubtedly, economic contracts with enterprises in every sector of machine building are the basic source of financing of sectorial science. However, these orders are of a temporary nature and cannot be the basis for the creation of an applied scientific reserve and the development of the scientific potential of sectorial science. At the same time the scientific and technical potential is a component of the economic potential, in connection with which considerable assets are being allocated for its maintenance abroad.

As a result of the degradation of sectorial science the annual economic impact from the use of inventions in 1992 as compared with 1991 decreased by 13.3 percent, which testifies to the inadequate use of the innovative potential. Moreover, for the most part such a trend was observed in heavy, power, and transport machine building (30.4 percent); in road construction and municipal machine building (40 percent). The share of science-intensive and technically complex products, which determine scientific and technical progress, in the total output of products came in 1990 to 28 percent. In 1992-1993 a substantial decrease in the volume of the output of these products occurred, which testifies to the appearance of stable negative trends in the modernization of machine building products.

The devising of new forms of the organization of research and development, which operate efficiently under the conditions of the market, is a longterm process that can hardly be completed in the next three to five years. In many cases it will not be possible to choose in a well-founded manner the best method of forming the scientific production cycle, which presumes the organizational unity of science and production. Therefore, the main thing for organs of administration, which regulate the destatization of scientific institutions, is to create the conditions for the identification of the demand for specific forms of scientific services. The organization of priority research and development should be carried out in the form of special-purpose state federal scientific and technical programs. Such programs should ensure, first of all, the

preservation of the accumulated scientific and technical potential and the development of competitive equipment and technology. The establishment of temporary structures within the Ministry of Science, the Higher School, and Technical Policy, which would be responsible for the fulfillment of specific programs, would distribute program assignments, and would manage their accomplishment, could be among the possible forms of the management of the implementation of such programs.

Telephone number: (095) 246-78-81

### Researcher Attacks Academy of Sciences, Claims Ineffectiveness

937A0160B Moscow NEZAVISIMAYA GAZETA  
in Russian 14 Sep 93 p 6

[Article by Andrey Vaganov under the rubric "Pro et contra": "Academic Science Did Not Die. In Soviet Russia It Simply Did Not Exist"]

[Text] "The academy...did not collapse as the highest scientific institution of Russia, as the main source of basic knowledge.... And this should be particularly emphasized today, since the numerous discussions about the crisis of our finances, about the dire straits of scientists, and about the decline of the prestige of science in the country—discussions which were often conducted in an abstract and superficial manner, in isolation from an understanding of how the entire country is living at this time—produced in social consciousness the notion of a profound scientific crisis and of the collapse of domestic science." This quotation and several that follow below were taken by me from the speech of Academician Yuriy Osipov, president of the Russian Academy of Sciences [RAS], at the general meeting of the RAS in December of last year. Thus, the crisis in Russian academic science exists merely in social consciousness and only as a result of abstract superficial discussions. "But, as it seems, they did not give rise at the academy to a wait-and-see mood and did not halt the work."

With great probability it is possible to assume that at the next general meeting of the RAS the speech of its president will be maintained in the same tones: Russian scientists during the ever accelerating fall into the financial abyss are continuing to create miracles, while maintaining domestic basic science at the world level. There will also be proof—the lengthy enumeration of what was made and how much was made with respect to all the departments of the RAS. And again a sacred idea will be heard as the leitmotif in the majority of statements: "It is a matter of the present impoverishment of science and our academy. This began even earlier, in 1990, but the real collapse occurred this year."

The most interesting thing is that it is actually a matter of the present impoverishment of science and the

academy. Only all this began considerably earlier than the respected president of the RAS assumes. About 75 years earlier.

### Roll Over Plato

It was 1918. The victorious revolution began by removing from libraries all "ideologically harmful" literature—the works of Plato, Pascal, and Descartes. A special edict was devoted to this. Comrade Ulyanov (Lenin) personally compiled the note with the list of books that were to be eliminated. Officials from the Ministry of Education (sic!), wishing to be holier than the Pope, supplemented this list, lumping together with it the works of Socrates, who, as is known, in his entire life did not write a single line.

Everything indicates: A special variety of science—Soviet—was being developed in the country. Like everything else Soviet, it was done at high speed. The natural selection in such cases of "red" professors and academicians, which was strict and based on Bolshevik principles, without respect of persons, began. The father of television Zvorykin, aircraft designer Sikorskiy, prominent chemists of the present Ipatyev and Chichibabin, the founder of sociogenetics Dobrzanskiy, physicist and geneticist Gamov—all of them and many others, who did not wish to become a turncoat, were forced to leave Russia. From 1917 until the formation of the USSR more than 10,000 certified engineers emigrated from the country.

Listen to how this sounds: certified engineer. And everything is said by this. And it is not necessary to add and explain anything more—certified engineer. This is not your present engineering and technical personnel with a hypertrophied megalomania, for the satisfaction of which they did not think up anything better than to establish their own academy—the engineering academy. Note, not the Society of Engineers of Russia, but namely an academy—in its own image. Now these are not just some senior engineers, but full members and corresponding members. Incidentally, I myself doubt very much that even one senior engineer has been elected to the Engineering Academy. But in each of the 17 sections several people are representatives of the powerful people of this world: the prime ministers of Russia and Ukraine, representatives of the staff of the president, the mayor of Moscow, UNESCO workers, executives of ministries, departments, and corporations in the last resort. And let the senior comrades from the "big" academy laugh condescendingly at their newly fledged colleagues. He laughs, as is known, who laughs last.

But then today, when there is such a squeeze with finances that one can neither breathe in nor...breathe out, look, such guards of academicians "from the wooden plow" will make it possible to hold out in the decisive battle for a place under the market sun. However that may be, for the present the presidium of the RAS is begging of the government assets if only for the purchase of foreign scientific periodicals, the Academy of Technological Sciences, having enlisted the support (including financial) of Yeltsin and Khasbulatov, is holding an international conference on nanotechnology.

### One-Thousandth of a Millimeter

Quite recently, while digging through piles of books, I came across a collection of articles and speeches of our last Nobel Prize winner in physics, Petr Leonidovich Kapitsa. Six years ago I did not buy this book, because for my wage of 130 rubles [R] it was expensive—R2. But not without reason does the likeable young lady regularly inform us from the television screen: "Time has no power over real values!" *Eksperiment, teoriya, praktika* (Experiment, Theory, Practice) is what the collection is called. And today it also costs R2. Of course, the question of whether or not to take it no longer arose for me.

This book for the most part is a rather trite, in my opinion, discourse of the great physicist on sociopolitical themes. But as a document of history, as the testimony of a witness of the development of the USSR Academy of Sciences its value is unquestionable. Several things in it simply astonished me. There is, for example, the report of Petr Leonidovich at the general meeting of the USSR Academy of Sciences in 1940, which was devoted to the problems of liquid helium.

Even if we assume that the general meeting of the USSR Academy of Sciences consisted entirely of scientists who were dealing with exclusively humanitarian problems, even in this case it is difficult at times to get rid of the impression that Kapitsa was not addressing the general meeting of the Academy of Sciences, but was giving a lecture at a rural club. "Assume that you hold a hand above a hot source, for example, a radiator—you will immediately begin to feel the heat, since the flow of warm air will transfer the heat to your hand. Such a transfer of heat together with the moving flow of matter is called convection. If you put a hand under the radiator, no heat will be felt, since the flow of warm air goes up, while the usual heat transfer of air is very small." Or else: "We succeeded in building a viscosimeter (an instrument for the measurement of viscosity), which had a very narrow slit, only half a micron (a micron is one-thousandth of a millimeter), through which the helium flowed." And the emotionally sincere appeal, with which Petr Leonidovich concluded his statement: "Science for its introduction also requires promotion. In our country the Academy of Sciences ought to cope with this task best of all"—evokes the sense even not of a tragicomedy, but of a reverie-farce (a very precise, in my opinion, word in this context, which was developed by Igor Severyanin). People who forget in part that a micron is one-thousandth of a millimeter as the plenipotentiaries of scientific and technical progress.

But you will not pin a sense, as they say, on a deed. And Sergey Pykhtin, the author of one of the articles in NEZAVISIMAYA GAZETA, in full earnest states (see NEZAVISIMAYA GAZETA, 7 August 1993): "Over the past century Russians have accomplished three scientific and technical revolutions, without having been inferior in anything, except everyday life, to the achievements of other civilizations." To all appearances, the academy coped successfully with the task of promotion for the

hammering into the head of our fellow countrymen the idea of the unconditional leadership of Soviet science in the world. Which it is impossible to say about the promotion of science for the purpose of introducing its achievements directly in physical production.

Thus, for example, world experience showed that a modern level in performance, reliability, power consumption, and design of machine building products is achievable only in case of the extensive use of new materials. In domestic machine building the share of composites comes to 0.2 percent, engineering plastics—0.1 percent, and engineering ceramics—0.04 percent, amorphous materials, metal composites, and functional ceramics are not used at all.

The estimates of the effectiveness of the outlays on science as the ratio of the increase of the output volume of machine building and the chemical and petrochemical sectors of industry (that is, the most science-intensive ones there are) to the sum of the total outlays on the conducting of scientific research simply cannot instill a sense of confidence even in the very, very last optimist. The value of the efficiency factor decreased by 13-15 percent over a five-year period: 1971-1975—0.733; 1976-1980—0.616; 1981-1985—0.535. And this is during the years when the spending on science increased from R81.4 billion to R130.1 billion (the data of A.Ye. Varshavskiy).

So that the impoverishment of the RAS in the purely scientific sense began by no means two years ago, together with the start of the financial cataclysms in the Russian state. (Incidentally, I will note in passing that the claims against the academy with regard to the technological backwardness of the country are not entirely legitimate. For "the Academy is not simply the sum of individual institutes, but a community of scientists, who are accustomed not to linking the depth of research with the utility of the ultimate goal...." That at least is what RAS President Yuriy Osipov believes.)

### 'Old Men Are Held in Respect Everywhere in Our Country'

The process of impoverishment, including with respect to personnel, was always characteristic of Soviet academic science. However, from statements of the leadership of the RAS it follows that the process of the "brain drain" fell upon the academy like a bolt from the blue. Seemingly convincing figures, which are called upon to substantiate with documents this pose of injured innocence, are cited. Whereas in 1989 more than 3,500 young specialists were taken on at the academy, in 1992 a little more than 1,000 were; whereas in 1989 about 70 percent of the people, who had completed graduate studies, were kept on at the academy, in 1991 less than half were; 13 percent of the workers of the RAS are retirees; during 1992 the number of associates of scientific institutions of the RAS decreased by 8.5 percent.

As the great schemer would often say, "I also have no objections to this thesis." Another thesis causes me

objections—that “the beginning of the process (the ‘brain drain’—A.V.) is visible back in 1989, when our society embarked on the path of openness” (everything is from the same speech of Yuriy Osipov at the General Meeting of the RAS). Nothing of the sort, dear Yuriy Sergeyevich. Moreover, I undertake to assert that the catastrophic process of the “brain drain” would have overtaken the RAS (at that time still the USSR Academy of Sciences) even if the “Iron Curtain” had been kept completely intact. True, in this case, perhaps, it should be called not a “brain drain,” but the “drying up of brains.”

“The aging of scientific personnel is occurring at all academies of sciences. At the USSR Academy of Sciences in 1980 the average age of scientific workers came to 41.3 as against 35.5 in 1970. The number of scientific workers 40 years old and younger decreased here during 1972-1982 from 62.1 percent to 46.2 percent, moreover, the share of scientific workers 30-40 years old especially decreased.” These data were drawn by me from a very interesting document (incidentally, a document exclusively “for official use,” as the inscription on the title page warns: the number of copies is 700)—*Kompleksnaya programma nauchno-tekhnicheskogo razvitiya SSSR na 1986-2005 gg. Razdel I.I: razvitiye fundamentalnykh issledovaniy (Akademii nauk) (The Comprehensive Program of the Scientific and Technical Development of the USSR for 1986-2005. Section I.I: The Development of Basic Research [the Academy of Sciences]), Moscow, the USSR Academy of Sciences, the USSR State Committee for Science and Technology, 1983. The cited graphs [graphs not reproduced], which describe the anticipated trends of the change of the shares of individual age groups of different age categories of scientific workers, are also taken from there. At that time a completely unambiguous warning was heard: Without the taking of the appropriate steps the age structure of scientific associates will worsen, moreover, the share of people over the age of 50 will increase significantly. That is when it was necessary to strike the bells of public opinion. Today it remains merely to state: What they fought for is what they cut themselves on*

#### Minutes of the Soviet Sages

It could not have been otherwise. It is significant that nearly all the scientists from the Academy of Sciences, with whom I have had occasion to speak in recent times, recall the “period of stagnation” in unison with nostalgic notes. The idea, which is developed by them, is simple: “Perhaps, the leaders of the former USSR were old decrepit men, but here they did not keep academic science as their charity.” And it does not occur to any of them that, perhaps, the organization, which in our country was called first the USSR Academy of Sciences and now the RAS, was also not an academy of sciences in the strict, European sense of the word. For the distinctive features of academic science, which were formulated back in the 18th century, are independence from popular opinions and the caprices of rulers. From this thesis the paradigm of “academic freedoms,” which specified the

principles of the interrelations between the scientific community and the political elite, was crystallized. If you wish, academic science, like the church, should be separate (and to put it better, remote) from the state. And this is not in the least at variance with the fact that in the West basic academic science is financed from federal budgets. It is simply that in the western type of civilization, where the market (“the expanded order of human interaction,” according to the definition of Nobel Prize winner Friedrich von Hayek) is the integrating element, society owing to synergetic laws shares or, at least, tolerates the values of the scientific community.

In societies like “Soviet” society ideology, which has been raised to the level of dogma, acts as such an integrating element. Political scientists and social scientists noticed long ago that in such “traditional” societies science is always thoroughly foreign. A foreign inclusion should be digested and dissolved without a precipitate—a normal reaction that is aimed at the maintenance of homeostasis.

Indeed, it is possible to imagine much, but just not Soviet academic science that is free of state ideology. It is coming to clinical cases: “...the doubts about the advisability of increasing the life span, in our opinion, are unfounded and are at variance with the program requirements of the CPSU and, therefore, should be rejected” (I.V. Vishev, *Problema lichnogo bessmertiya (The Problem of Personal Immortality)*, Novosibirsk, Nauka, the Siberian Department, 1990, p. 182; the reviewers: Doctor of Biological Sciences G.D. Berdyshev, Doctors of Philosophical Sciences B.D. Slavin and Ya.Ye. Stul, Candidate of Philosophical Sciences G.A. Antipov).

I want once again to emphasize that all this is just the tip of the iceberg. Its submerged part has been starting to come to light a little only in most recent times. From the minutes of conference No. 1 of the All-Union Association of Workers of Science and Technology for the Promotion of the Building of Socialism: “At the same time as the organization of society it is necessary subsequently to strengthen the material base of the scientific institutions of the People’s Commissariat of Education, scientific and technical administrations, and other departments and at the same time to weaken the material base of the Academy of Sciences and those associated with it.” Among others there were present at the meeting and supported its decisions: A. Vyshinskiy—rector of the 1st Moscow State University; V. Sverdlov—chairman of the collegium of the Scientific and Technical Administration of Supreme Council of the National Economy; A. Bakh—member of the collegium of the Supreme Council of the National Economy and director of the Physical Chemistry Institute.

It cannot be helped, as Merab Mamardashvili once noted, “there is a great multitude of those who are prepared to flirt with any power you like, including



Soviet power." They flirted successfully: The last Nobel Prize to a domestic scientist was presented 15 years ago for works of the 1930s and 1940s.

I would consider my task completely unaccomplished, if he, who has read all the above, were to think: "Well, here is another one who is kicking the semidecomposed corpse of Bolshevism. What could be easier! And I am sick of it. But be that as it may, the present rulers of Russia are finishing off the remains of Soviet academic science."

Alas, the causes of the impudent and therefore, suicidal attitude of the present powers that be toward Russian science are so serious that they require separate discussion. But since a conflict exists, then at least two sides are participating in it. Now only a lazy person is not cursing the government or the Supreme Soviet—take your choice. While "all progressive mankind," undoubtedly is on the side of the Russian Academy of Sciences. However, as is known, in a quarrel whoever is more clever is to blame.



**Fortov Interviewed on Russian Basic Research Fund**

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in Russian 1 Sep 93 p 6

[Interview with Academician Vladimir Yevgenyevich Fortov, chairman of the Russian Basic Research Fund, by Andrey Vaganov, under the rubric "Appointments"; place and date not given: "'We Are Ineptly Losing Scientific Schools.' The Chairman of the Russian Basic Research Fund on the Situation in Domestic Science"—first paragraph is NEZAVISIMAYA GAZETA introduction]

[Text] By an edict of the president of Russia Academician Vladimir Yevgenyevich Fortov was appointed chairman of the Russian Basic Research Fund. The new chairman of the fund is 47 years old. He graduated with honors from the Moscow Physical Technical Institute. He worked at the elite institute of chemical physics and institute of high temperatures of the Russian Academy of Sciences. He is a specialist in the field of the physics of extremely high temperatures and pressures, the physics of strong shock waves and dense plasma. For work on the international VEGA project—the study of Halley's comet—he received the Labor Red Banner Order. He is the winner of the 1988 State Prize for works on mathematics and physics. He is a member of the American Physical Society and the New York Academy of Sciences. He is vice president of the International Union on High-Pressure Physics and Engineering. He is the director of the scientific research center of the thermal physics of impulse functions of the RAS [Russian Academy of Sciences] and the head of a chair of the Moscow Physical Technical Institute.

**Vaganov:** The main direction of your scientific activity is the physics of extremely high temperatures and pressures. There is a kind of symbolism in this: Today, when Russian science itself is in an extreme state, a specialist of precisely this type has become the new director of the Russian Basic Research Fund—an organization, with which many scientists are linking their last hopes.

What are the basic goals and tasks of the Basic Research Fund?

**Fortov:** The fund was organized in accordance with the Edict of the president of Russia of 27 April 1992, "On Urgent Steps on the Preservation of the Scientific Potential of the Russian Federation." Many of the points of this edict have simply remained on paper (tax credits, inexpensive tickets, investments). But as to the organization of the Basic Research Fund, this point has started working. A great service in this matter belongs to Academician A. A. Gonchar, the organizing director of the RFFI [Russian Basic Research Fund], and Minister of Science and Technical Policy B. G. Saltykov, as well as to Academician V. P. Shorin, chairman of the committee for science of the Supreme Soviet. We are now also gratefully enjoying their active support.

The work of the RFFI is based on very progressive and democratic principles.

**Vaganov:** In what do they consist?

**Fortov:** The fund is a state, self-administered organization. It finances basic research and development, which are performed at any scientific institutions: higher educational institutions, the academy, and sectorial scientific research institutes. The main thing is that the work would correspond to a high scientific level and would actually be basic. The money is issued in someone's name—not to institutes, as before, but to the performers personally.

Second. The fund distributes this money on a competitive basis. Scientists themselves decide who as a result of this competition won.

Generally speaking, the money, from which the RFFI is formed, is a small amount—3 percent of all the resources that our country expends on science. In current prices this is about 30 billion rubles [R] a year. The typical grant of the fund is up to R5 million a year.

Bear in mind that, according to the latest estimates, the share of the assets, which are being released for scientific work proper at the Russian Academy of Sciences, has decreased to less than one-fiftieth. Nearly all the money is being spent on excessive utility payments and starvation wages. The situation at higher educational institutions and sectorial scientific research institutes is even worse. So that for many collectives grants of the fund are real aid which makes it possible to keep "afloat."

But the money is being spent not just on enterprising research projects—60 percent of the assets of the RFFI are spent on this; 20 percent are used for the maintenance of the material base of basic research; 7-8 percent are used for the support of the participation of our scientists in conferences and symposiums; on the order of 5-8 percent are used for publishing activity, electronic scientific databases, and means of communication of scientists.

**Vaganov:** Have the first grants of the fund already been presented?

**Fortov:** Yes, in January of this year. There were approximately 20,000 applications. We satisfied one-eighth of them. Physics and astronomy—about 22 percent of all the assets went here; 16 percent each went to: mathematics and mechanics; information science; chemistry; the earth sciences; the social sciences. These are the basic fields of scientific knowledge, to which grants were allocated. Some of the strong works had to be rejected or postponed—for the fund has only 3 percent of the "science" money!

The active development of the basic structures of the fund—the executive committee, the science divisions, expert councils, groups of experts, and so forth—is now taking place. Much attention is being devoted to the drafting of the standard documents of the funds—the

"rules of the game," in accordance with which the assets of the fund will be distributed. Our basic task here is to create the most efficient and objective system of selection, which is protected against "extrascientific" influence and subjectivism. For this purpose we are enlisting in the work of the fund the best, most authoritative scientists of the country. In accordance with our rules all the standard documents of the fund will be published.

The system of funds is a link in the chain of steps that the government now needs to take in order to save Russian science.

**Vaganov:** Back in December of last year at the general meeting of the RAS its president, Academician Osipov, stressed that the academy had not collapsed and was retaining its high potential and prestige in the world scientific community.

**Fortov:** This, of course, is so. However, now the situation in our science beyond any exaggeration is comatose. We are catastrophically abruptly losing our scientific positions and schools, the level of scientific research is falling, there are no journals and books. Young people are leaving science and engineering for business or abroad.

Without science there is no future. And precisely during periods of abrupt reorganizations, when "turbulence," the switching from some values to others, emerges in society, the role of science, of course, is very important. During the 17th century, when the industrial revolution had just begun, English philosopher Francis Bacon regarded science as a unique form of social inheritance—social memory, the mechanism of the transfer of experience and knowledge from generation to generation. Precisely this mechanism sped up in a qualitative manner the development of human civilization as compared with the slow evolutionary route of "trial and error," which all the rest of nature traditionally takes.

I believe that one of the most serious diseases of our times is the indifference, if not to say the negative attitude of some state structures toward science. And the RFFI is called upon to help Russian scientists somehow to survive these difficult times. An urgent set of vigorous and comprehensive steps is needed here.

**Vaganov:** There is somewhere here to expand....

**Fortov:** The forces of the RFFI alone all the same are not enough. There are scientific instrument making, scientific literature, the financial benefits for researchers, which have been adopted everywhere in the world, the training of young scientists, and much, much more, without which science cannot live. But I am convinced that the main thing now is a phenomenon, which is shameful for Russia, but typical of underdeveloped countries of the third world—the "brain drain." There is real hope here for the enterprising project of a number of members of the RAS, which is supported by the RF [Russian Federation] Ministry of Science and its minister, B. G. Saltykov. It

is suggested in it that the government allocate money for the direct support of prominent scientists, which would enable them to live and work in Russia. According to one of the scenarios our fund will also take part in this project. If this project is approved, I am certain that very many scientists will return to Russia to work. Although, I stress, any scientist, like every free man, should have the opportunity to live and work in any country. But the state should not intentionally force him out. Yet now precisely this is happening.

**Vaganov:** But do you not believe that that is much ballast in our science, that it is insufficiently efficient?

**Fortov:** Here I will not agree with you. There is, of course, ballast. But the paradox is that we are losing not only ballast, but also the most capable and energetic people and unique schools. Russian science had and has very strong points. In a historically short time in a relatively backward country, which Russia was, completely fantastic science was created! Our scientific level in many directions surpasses the western level (in particular, in my specialty—the physics of extreme states). And all this is owing to our scientific schools: Kolmogorov, Vernadskiy, Landau, Sakharov, Zeldovich, and many others. But now we are losing these schools. This is a catastrophe. Especially as the decrease of the money for science does not provide any real saving. After all, as it is only 2-3 percent of the national budget is being spent on it.

For the Chinese the concept "crisis" is expressed by two hieroglyphs: "danger" and "outcome." In my opinion, society does not sense now the danger which threatens our science. The main misfortune, I repeat, is the "brain drain." The situation in our country now is in many respects similar to the one that existed in Germany after its defeat in World War I. At that time the ravaged, demoralized, and inflation-torn country had enough political will and intelligence for the establishment of the Society for Emergency Aid to Science. By the direct support of leading scientists it was possible at that time to halt the "brain drain" and to preserve German science. As a result before World War II there was in Germany, for example, the strongest school of physicists in the world: Einstein, Planck, Heisenberg, Bethe, Bloch, and Hahn. The Germans also had first-class science in many other directions. With the coming of Hitler to power, when the Nazis began to settle scores in science, this very thin (a few percent) stratum of scientists was forced to leave the country. Many from this list went away. And in fact thus far Germany has not been able to restore its former scientific potential, although it is exerting enormous efforts for this, using in part emigrants from Russia.

Russia established its own basic science in a historically short time—in less than two centuries—and almost exclusively on its own. Another heyday of it fell to the 1960s. At present basic science of Russia is faced with the most serious challenge in its history. Here in Russia

for a number of reasons a quite unique scientific community formed. And now we are ineptly losing it.

**Vaganov:** But does it not seem to you that in Russia science in general is acting as a kind of foreign body?

**Fortov:** The attitude toward science on the part of society in all countries is more or less identical. If science were transferred to the everyday level, there would be no support for it in the United States, Germany, or Japan. This is a matter not of everyday thinking, but of state thinking. If we lose basic science, we will lose, apart from all else, the ability not just to create for ourselves, but even to understand what is happening in the world, what is good and what is bad. We will go blind. And the economic losses will be quite immense. I am certain that basic science and the market are incompatible things. And one must not dump science on the market, it will perish. Public opinion is not as badly disposed to science as it seems. This is our Russian tradition. A statistic recently caught my eye: Up to 49 percent of the respondents—here, in Russia!—believe that it is necessary to increase the allocations for science. Lately, so it seems to me, among our leaders a sense of alarm over science and the desire to help it have begun to form. An example of this is the organization of our fund—an important state act of real aid to scientists, for which we are all very grateful to the government.

For the majority of scientists the possibility of interesting work is above everything else. And scientists were never money magnates. This is the middle class in all countries. Among my foreign colleagues who are my friends there is not one who drives a Mercedes. But when they take from scientists the opportunity to work, this causes a very pronounced negative reaction. In this case scientists are not inclined to active protests, they do not organize demonstrations—they pack their bags and leave for the West. Does this conform to the national interests of Russia?

#### **Tax Exemptions Needed To Arrest 'Brain Drain'**

937A0157B Moscow IZVESTIYA in Russian  
27 Aug 93 p 4

[Article by Academician Zhores Alferov, director of the Physical Technical Institute imeni A.F. Ioffe and vice president of the Russian Academy of Sciences: "If One Cannot Afford Science, the Future Is Sad"—first paragraph is IZVESTIYA introduction]

[Text] St. Petersburg—Recently a man, whom I deeply respect, burst into tears in my office. Resistant to the adversities of life, he completely lost heart after a family drama. His wife was engaging in commerce and announced resolutely to him: "I do not need you. You have spent your entire life in vain." This man is a State Prize winner and a world-famous scientist.

It hurts me to talk about many colleagues, who, in spite of conscientious work and scientific services, are barely making ends meet. I did not think, for example, that I

would ever hear the sad story about a professor of the Physical Technical Institute, who in the evenings peddles cigarettes at the Pionerskaya metro station. Alas, such a time has come.

Yes, scientific workers are not an exception. Like nearly all of Russia, they are living on hopes for the future. They can tolerate a meager wage for years, if they have the chance to work normally and to engage in research. But do they have this chance today, when a situation, which is close to collapse, is forming in domestic science? I will name the following figures. In 1991 the budget of the Physical Technical Institute, which was formed from various sources (direct financing from the USSR Academy of Sciences and the State Committee for Science, assets in accordance with special decisions of the government for the development of promising directions, economic contracts with enterprises), came to 75 million rubles. This money was enough for the maintenance of the institute, the wages of its associates, and the purchase of materials and equipment. Last year our budget in real prices decreased by several fold. It was enough only for wages and utility payments. Any new equipment was already out of the question. The same story is also being repeated now: We are again unable to spend a kopeck for the acquisition of materials and equipment. It is possible to live a year in such a situation. It is possible with very great difficulty to scrape by for two years. After that the process of disintegration will begin.

Since the day of its founding—all the past 75 years—the Physical Technical Institute has conducted basic research in various fields of physics and has engaged in the solution of fundamental problems of engineering and technology. I could name many sectors of industry, which appeared in the country owing to its activity. These are domestic radar, the production of semiconductors, lasers, and light isotopes, optoelectronics, to a significant extent the nuclear industry, mass spectrometry, and a large number of other methods and instruments for the control of technological processes.

The results of basic institute research always found application at enterprises of the country. The necessary assets were allocated for the implementation of our developments. It was not less important that scientists saw how what had been conceived by them was implemented.

Today the leading sectors of industry, with which we dealt, have been ruined. They have no time for contacts with science. What there will be tomorrow and in five to 10 years does not worry them. They are concerned only with how to survive today. But no place is sacred. Scientific developments, which were not claimed by domestic industry, interested the West.

We are also interested in ties of this sort. After all, international scientific cooperation is for us both a means of survival and an opportunity to implement everything that would be left lying on the shelf. Given a

reasonable attitude toward the matter we will be able to return the technology, which was modified abroad, to our industry, as soon as it is ready for this.

I want to elaborate on one circumstance: In spite of the mistakes, which are being made when concluding contracts, we are firmly abiding by the rule to track fundamental innovations and we never give anyone exclusive rights to what has been done by us. Among the applied studies there are major projects, there are also many minor ones, about which our laboratory heads are coming to agreements with foreign clients. And everything would be wonderful, but...

Academic scientific institutions achieved with much difficulty exemption from taxes with respect to grants. But even this benefit was reduced to the utmost: They exempted from taxes only the grants of charitable foundations. All others, which are given out by governmental or private organizations, are laid under tribute without any discounts. To what does this lead? Knowing that in his native country they will completely fleece him, the laboratory head, who has come to an agreement with a western partner about joint work, plans the expenditures so that the earned money is used for the conducting of research abroad, business trips of associates, and the purchase of one or two personal computers. It turns out that the institute budget loses these assets, while among leading scientists the desire to work in the homeland, where there are no condition to realize oneself, disappears. A scientist cannot live without doing his own job. If he completely loses faith in the possibility of productive scientific work, he will leave without fail. And there is nothing you can do about this.

By presidential edict the institutes of the Russian Academy of Sciences should have been relieved of the tax burden both within the country and in foreign economic activity. However, things never got as far as the implementation of the edict. And as a result simply amazing things are happening. For example, the Physical Technical Institute has a contract with a research center of the Bell Telephone Company on four exclusively theoretical projects. But the company cannot give grants. It signed a contract with us. But for it we should pay a profit tax. One would like to know what kind of a profit a project, in which theoretical calculations of Auger recombination are made, will yield?

I have been fighting for a long time and persistently for the exemption from taxes (especially in foreign economic activity) of research institutions under scientific, noncommercial contracts and agreements. Only strong and competitive organizations are capable of deriving a decent income from them. The same Physical Technical

Institute under favorable conditions and given a judicious state financial policy could double its budget.

Today the tax receipts of the treasury from all the institutes of the Russian Academy can hardly exceed \$20-25 million a year. Is it really that hard to understand that under the present difficult conditions they could help several tens of major institutes to survive, which would thereby make it possible to preserve in the name of the future of Russia its scientific potential?

Richard Feynman, a most well-known American theoretical physicist, once said that the equations of Maxwell are for the history of mankind of greater importance than the French Revolution. Indeed, without these equations there would be neither modern electrical engineering nor electronics. I will add to the words spoken by Feynman: Two scientific discoveries, which were awarded the Nobel Prize, changed beyond recognition the face of the second half of the 20th century. One was made by John Bardeen, William Shockley, and Walter Brattain, as a result of which transistors appears, the other was made by Charles Townes, Nikolay Basov, and Aleksandr Prokhorov, who discovered the principles of the production of lasers.

Our domestic science held a worthy place in the world. Its prestige within the country was also unusually great. Today it has decreased almost to the zero level. In recent years Russia has lost at least two generations of young scientists, who will never return to science. These generations have departed for commercial structures.

Academician Abram Fedorovich Ioffe, the wise founder of the Physical Technical Institute, looked far ahead, establishing in 1919 at the Polytechnical Institute of Petrograd a physics and mechanics faculty. There for the first time in the world they began to train engineers, who knew physics not by hearsay, and physicists, who understood engineering problems. Remembering this experience, five years ago we opened a physical technical faculty and established a specialized secondary school in order to obtain a continuous system of the education and training of scientific personnel. Today it is still existing somehow, but tomorrow it may also fall to pieces.

Science is a self-adjusting system. But if they do not pay this system money, if they say to scientists "find sustenance yourselves" and then and there take away the crumbs earned by them, without leaving a penny for a subsistence wage, the state is destroying itself.

I do not understand the people who say: Present-day Russia cannot afford big science. Because if the **SCIENCE**, which was developed in a great country, had now actually become unaffordable for it, thus, **THIS** Russia does not have any future. It is with such bitter thoughts that I go to bed every evening and I wake up with them every morning.



**Yeltsin Decree Raises Scientists Wages**

937A159A Moscow IZVESTIYA, in Russian  
21 Sep 93 p 2

[Article by Sergey Leskov, under the title Presidential Decree Will Help Scientists Think About Science More]

[Text] The President of Russia has signed a decree directed toward the material support of scientists employed in budget-funded organizations. Even after a fairly large increase in wages, incomes in this sphere will remain among the lowest in the country; therefore, the document may be regarded above all as moral support which leaves the scientists with hope for a better life in the indefinite future.

The President has ordered, starting 1 January 1994, the establishment of 5 thousand state stipends in the amount of 75 thousand rubles a month for leading Russian scientists and 1 thousand state stipends of 50 thousand rubles a month for talented young scientists. Starting 1 November 1993, a salary rate was established for the rank, of 150 thousand for academicians of the Russian Academy of Sciences, and 75 thousand rubles for corresponding members. Doctors and candidates of science (including those working in higher educational institutions [vuzy]) will begin to receive an additional payment of 50 percent of the salary rate.

Thus, the base pay of the senior research associate in a Scientific Research Institute [NII] and of a senior lecturer in a higher educational institution will reach 75 thousand rubles, and that of a leading and chief research associate in a Scientific Research Institute and professor in a higher educational institution, 100-110 thousand.

It is hard to say whether the order will be able to slow down the drain of scientists from research into commercial structures. At the present moment, for example, only 100 doctors and 1,500 candidates of science remain in industrial research throughout Russia. The relative easing of the material situation of scientists does not resolve a no less acute problem of research—the lack of means for investigatory work. Were it not for the solid base laid down in past years, and Western help, research in Russia would today be at a standstill. It would be hard to disagree with the opinion of Yuriy Osipov, the President of the Russian Academy of Sciences, stated in a conversation with Izvestiya's correspondent, that the decree is important above all from a moral perspective.

It is true, the considerations entering into the derivation of the exactly precise ratio—5 thousand leading to 1 thousand talented scientists—are not entirely clear. Given the fact that the disinclination of youth to tie their fate to research acquires ever greater acuteness with each passing year, the document signed also maintains the tendency to support already established scientists through the automatic additional payment for academicians, doctors, and candidates, something not practiced by a single developed country.

Since the Supreme Soviet is now discussing a proposal advanced by the Ministry of Defense to callup postgraduate research students into the army, from the point of view of the country's defense capability, these are trifles. There are already fewer postgraduate research students in the country than doctors of sciences, only about twenty thousand. Yuriy Osipov, who has written a great number of thus far fruitless messages, called this idea a scandalous absurdity.



### **Russian Academy of Sciences Blocks Privatization Efforts**

937A0154A Moscow *DELOVOY MIR* in Russian  
24 Aug 93 p 13

[Article by V.P.: "It Is Not Yet Boiling, But It Is Already Bubbling"]

[Text] It is possible to describe in this way the situation with the ban of the Presidium of the RAS [Russian Academy of Sciences] on the privatization of academic enterprises, institutions, and organizations. The ban is having an effect, they are not privatizing anything, and several applications for privatization, which were received by the State Committee for the Management of State Property from academic enterprises in recent weeks, were rejected. However, in the opinion of Yuriy Lebedev, a staff member of the State Committee for the Management of State Property, who is responsible for privatization in the scientific sphere, the pressure of the malcontents is increasing and soon may develop into some cataclysm.

For the most part this concerns various service structures of academic design bureaus, particularly in science towns. They have been completely nonplussed: Having been converted long ago to full cost accounting, they do not receive any money from the RAS and are also unable to earn a living while they are within the structure of the academy. The leadership of the academy completely refuses to release them from its tutelage.

The directors of academic institutes do not intend to be privatized, but want very much to earn money, by concluding contracts on joint activity with various firms. However, the Moscow Registration Office is palming them off to the State Committee for the Management of State Property, inasmuch as without its knowledge such documents under the law are not registered. The institutes, which are subordinate to the academy, in contrast to it are legal persons (the RAS, as is known, thus far cannot specify its legal status and its charter is not registered anywhere), but, as it turns out, are also not completely competent, inasmuch as (a) their founding documents—charters and so forth—as a rule, do not satisfy the existing requirements and (b) are registered in departments of the RAS, which, not being legal persons, do not have the right to approval under the law. Therefore, there is nothing left for the State Committee for the Management of State Property to do but also to put the ball in the court of the poor directors, postponing the next meeting until they have less vulnerable documentation.

They, naturally, are sent to the academy. However, at the academy, which does not like to recognize Russian laws, which are not to its liking, they categorically prohibit founding documents to be altered.

As a result, just as in the case with the already mentioned design bureaus, contracts, particularly with foreign participants, are rotting in large numbers. The latter are

very surprised, they refuse to understand now there can be such a state of affairs in nature in general.

In this sense the institutes with an asterisk, that is, institutes of dual subordination, were more lucky: They, as soon as similar problems arise for them, go to their other boss, bypassing the academy, and settle everything. But, as is known, there are only a handful of institutes with an asterisk in the academy directory.

In the words of Yuriy Lebedev, this was a cause (which is no less significant than the lack of real budget financing) of the sharp and extremely dangerous slowdown of academic scientific activity.

### **Major Reorganization, New Director at NPO Molniya**

937Q0125A Moscow *KOMMERSANT DAILY*  
in Russian No 74, 22 Apr 93 p 2

[Unsigned article: "Aerospace Firm Intends to Live by Market Laws"; the first paragraph is an introduction]

[Text] The well-known Molniya aerospace company, which developed the multiply reusable Buran ship, is entering into a period of radical transformation of its structure and economic strategy. Yesterday the State Committee for Industrial Defense Branches confirmed a new general director of this scientific production association. Aleksandr Bashilov, former chief engineer of the Molniya company, became the new director. He is proposing a new concept for company development oriented on survival under market conditions. The program provides for establishing economically independent subdivisions combined into a state aerospace company. Mr. Bashilov feels that in the near future the export of a business aircraft developed by the company may bring in the greatest profit.

The Molniya enterprise of the former Ministry of the Aviation Industry was established for developing the multiply reusable Buran spaceship. The general director of the firm, from the moment of its founding, was Gleb Lozino-Lozinskiy, who earlier directed work on the space aircraft constructed by the MiG company. Up to 1986 the operation of the Molniya was financed on a priority basis because there was no doubt as to the feasibility of constructing the Buran. The Molniya honorably executed its mission, it constructed the Soviet Space Shuttle, but the economic situation in the country has changed.

During the last three years state orders for military-industrial enterprises were reduced by 60 percent and work on new programs ceased. The Molniya firm was in an especially difficult situation because it had a quite narrow specialization. As a result of the financial problems of the enterprise, in February 1993, on the basis of a resolution of a general assembly of enterprise specialists, the Committee for Industrial Defense Branches terminated the employment contract with the general director Mr. Lozino-Lozinskiy. The

assembly also decided to work out a program for bringing the enterprise out of its crisis and to select a new director. As a result of the voting Aleksandr Bashilov became the new director.

The ideas of the new director are oriented on a direct commercial purposefulness of most of the programs and a partial decentralization of enterprise control. The forming structural subdivisions of the association are being given a higher degree of independence. At this moment the degree of this independence and the method for its juridical embodiment have not yet been finally determined. The company will be directed by a board of directors which will include representatives only of those subdivisions which are yielding a real profit (a fixed part of the profit will be allocated to a fund for the stabilization and development of the company).

The central company will be the holder of the fixed assets and structures for whose leasing all the remaining subdivisions will conclude agreements. The search for orders, it is assumed, will be undertaken by both the board of directors and by the subdivisions. The central accounting office of the company will handle business with the taxation and state budget authorities.

During 1993 state financing will support about 40 percent of the enterprise's workload (military orders and maintenance of the Buran program), but the remaining resources will be directed to the most promising commercial programs: minifactories for the reworking of agricultural products and producing equipment and tools, based on high-technology developments of the enterprise. Mister Bashilov feels that the most promising commercial program of the enterprise may be the export of the Molniya-1 business class aircraft, developed at the enterprise, which Western experts have highly rated. The standard production of the aircraft has now been assigned to the Samara Aviation Enterprise and negotiations are in progress on its export to one of the European countries.

### **Russian Weapons Developers Face Uncertain Future**

937A0153A Moscow *RABOCHAYA TRIBUNA*  
in Russian 13, 17 Aug 93 p 3

[Article by Mikhail Popov, *RABOCHAYA TRIBUNA* correspondent, Miass, Chelyabinsk Oblast: "We Sell Ourselves. But the Motherland—Never! The 'Carriers of Secrets' Never Crossed the Boundary of the Country and Poverty Line"; the first paragraph is an introduction]

[Text] *RABOCHAYA TRIBUNA* has already told how the "quiet" departure of a large group of rocket building specialists for abroad was prevented (RT, 11 February 1993). But, we think, it is impossible to limit ourselves only to the detective aspect of this story.

The departure of the "defense workers" of the highest class which never took place graphically confirmed the importance of a problem which until now has been

talked about in a low voice. What, will people say, if strategic "brains" flow abroad, one group after another? In a low voice because it has no precedent. But now there is. And the time has come for a very very serious discussion of a citizen's responsibility. And I insist most emphatically: responsibility not only of the scientists to whom secrets of state importance were entrusted. The responsibility also is of the state which entrusted these secrets to them and does not wish to provide the means for their sustenance...

"Probably to some we seem to be self-seeking. They are pursuing, they say, the bloody dollar. Pardon me, but this is not so. We went there to work! Because here they do not give us anything to do, we busy ourselves with all kinds of tomfoolery, even meat processing. That's what we do, we rocket specialists..."

The pain with which these words were uttered left no doubts of their sincerity. And you believe that he is no self-seeker—this Yuriy Bessarabov, seated opposite me, a leading specialist at the Machine Building Design Bureau imeni Academician V. Makeyev in Miass. He has already worked for 31 years at that enterprise and until recently headed the theoretical design section. But health problems arose and it was necessary to transfer to an engineering position. He joined the ranks of the group of specialists who were unsuccessfully trying to leave for North Korea to earn a living. And now I tell you: methods developed by Bessarabov have been introduced not only into the practical work of the design bureau, but also are used at many other defense enterprises. He has a mass of studies published in both our country and abroad. What he does not have is an academic degree. He considered the defense of a dissertation to be an empty formality and he did not want to find the time for that purpose. "Yes, so he has no degree—so what's a doctor of science!" declare his colleagues in a single voice.

But in general in the "group of escapees" to the Korean People's Democratic Republic there were all kinds of people—both doctors and candidates of sciences, and meritorious inventors, and three were even winners of the State Prize. Only not all of them made contact with the journalist. Some did not give consent for the mentioning of their last name, although they did not stand aside from the conversation. So what? I understand them. The scientists still consider themselves to be an offended group; they feel that their departure was stopped without justification and they see in this intrigues of the Ministry of Public Security and the leadership of their own enterprise. It would seem that right here and now they would tell all, analyze what had happened, but to what purpose? No, just clam up...

At the main scientific center of national rocket construction, namely the Design Bureau imeni Makeyev, a regime of high secrecy persists. Nevertheless, the tabu has been removed on the discussion of some themes. Serious problems have arisen, but if you keep your mouth shut you will not be excluded from the group.

The situation now at this very large scientific center, let's say it outright, is not joyful. This arose as a direct consequence of a radical change in the defense concepts of the state, and this was further aggravated by the swiftness of the rates of introduction of a market economy in the country. Military orders have dropped to a minimum and this is a slap in the face for enterprises of the military-industrial complex. The factories not succeeding in restructuring their technological layouts to the output of peaceful production have begun to suffocate. So what can be said of purely scientific institutions such as the Design Bureau imeni Makeyev? After all, all its "fixed assets" are the gray matter of the working intellectuals. The people, if they be Solomons, under market conditions suddenly found themselves in the position of chips cast onto the water: they may turn up who knows where?

"All my life I made only rockets, I know how to make only rockets and I only want to make rockets," declares Bessarabov, supported by his friends. "My methods are good for another twenty years, if they are developed. And they say to me: stop!"

Two years ago, when the trend to a reduction in military orders began to acquire a threatening character, the enterprise, tossed at the will of the waves, began to feel its own way in order to emerge from the crisis.

Unfortunately, science without a production base is nothing. Former machine building enterprises, linked together with the design bureau in a single chain, became independent and cooperation collapsed. Financing was necessary in order to create at least some of its own production, for the practical embodiment of scientific ideas. It was necessary to "track these finances down" in Moscow corridors.

Half of 1992 passed before 55 million rubles were finally tracked down. The most critical time, a time of sharp inflation of prices and despair. A time of large-scale layoffs. A thousand persons, leading specialists and highly skilled workers, have been laid off from the industrial group (the main section of the design bureau) during the past year. Naturally, they have gone where it is a little easier to breathe—to the Ural Automobile Plant, to Miasslektroapparat, to small enterprises and commercial organizations.

Precisely during this very difficult period Anatoliy Rubtsov, also a scientist, a "defense worker," already acquainted with some workers at the enterprise from his classroom days at the Moscow Physical Technical Institute, turned up at Miass. What he proposed to the leadership of the design bureau was nothing criminal: recruit scientists to work under contract in one of the foreign countries. For example, in China. Or in North Korea. At Miass they themselves had already thought about this (and even now are continuing to work out possible variants in the most different regions). Such an approach makes it possible under conditions of a decline in production to preserve the scientific potential and

personnel, makes it possible for specialists to upgrade their earnings and in the process bring foreign exchange revenue to the enterprise.

However, taking into account the character of the design bureau, one requirement stands out at the forefront—total coordination of the contract with all higher levels up to and including the signing of inter-governmental agreements. Alas, in our specific case a different path was taken. A group for departure for work began to be organized on the basis of a private initiative and the enterprise in this case was not even informed about the contract.

This is indicative: the Korean side vigorously supported in the scientists an assurance of the total legality of the contract. They constantly made references to higher authorities supposedly giving permission. It is true that not one scientist with whom I chanced to converse had laid eyes on confirming documents: everything was accepted with confidence in the words of the organizers of the excursion. This credulity also led to the sorrowful result.

But let's return to the motives for the departure. Very scarce specialists, being part of the national heritage, all their lives feeling their special significance for the country, suddenly were not needed by it.

"We are now living worse than beggars," said those arriving at the meeting. "In October, when we tried to leave, our salary was 3,000 rubles. And at the very same time office cleaners at the automobile plant were paid 6,000, can you imagine that!"

Since then the situation has changed, but not by much. Yes, the wage for the design bureau industrial group averaged, for example, 12,000 rubles in January, but in June it already was 47,000. But how the prices had jumped! Indeed, at the adjacent enterprises—the same Ural Automobile Plant or Elektroapparat—the average wage was only a little bit higher. "But there the specialists at our level received three times more!" exclaim the rocket builders with annoyance.

In North Korea they also did not promise them wonders. One promised 700 dollars a month, another 1,200, a third—2,000 and then some. The Americans will laugh till they split their sides; hearing about such sums they will decide that a bad trick is being played on them.

Someone calculated that during five years of contract work he could acquire a car not only for himself, but also for his children. Another person decided to save money for an apartment. And what's so bad about simply living like a human being for some time, considering that the inviting side assumed all concerns for placement, housing and other amenities? Nothing reprehensible, a normal desire. Moreover, when a scientist thinks every second about a piece of bread, he ceases to be a scientist.

"I traveled to Germany where Russia Days were being celebrated," sighs Valeriy Usachev, who had devoted 33

years to the enterprise. "And there I met with one of our former colleagues, an engineer, who went there two years ago. He lives in a two-room apartment. He is thinking about buying a car—it costs 8000 dollars. But in our country this would not come about after two years; we work for 30 years and two families live together in a two-room apartment. And there is no gleam of hope."

And again a glance to where the grass is greener. It is bitter to figure out how many computers an American specialist can buy with one paycheck and how many a Russian specialist can buy in ten years. Or still simpler—how many of the cheapest "Astra" cigarettes can be purchased with the wages of former years and how many now. It appears that it is ten times fewer.

If only the wages of scientists, like their rockets, were raised now to space heights, but they are forced to count cigarettes. Perhaps the time will not be long in coming before nails are driven in by computers...

[The second part of the article follows; the first paragraph is an introduction.]

There was a time when people envied them. They invested their intellect in the solution of problems to which the state assigned priority and accordingly they received good return. Today the intellectual elite of the nation is below the poverty line.

Here is Mashgorodok. Although there are no barriers separating it from Miass, it is like we had entered another world. Residences, social and cultural facilities, good organization of public facilities: everything is in proper order, as it should be. The support of this infrastructure rests on the "defense workers," even without this experiencing incredible difficulties. Things go wrong. There are probably some who gloat: good things don't last forever.

And at the enterprise, to which, with their heads hanging, the designers had to return, there were those who were happy at their failure in departing for North Korea. But many nevertheless sincerely sympathized: these folks had such a chance to live like human beings and it was denied them!

We looked into the reasons for departure: material well-being and gloominess of the prospects for their own enterprise. But it must be especially emphasized: the reasons were so strong that the people simply ceased to listen to the voices of reason. Here there should have been a little healthy skepticism, looking into what was involved. No question about that! And they should have thought the matter over a little.

For example, that in a foreign country they could be entirely without the support of the Russian state. Just how much would their new "bosses" want and, moreover, it was unknown to what lengths they would go in order to get secrets, even if they be thirty years old. Who then would ensure the personal safety of the scientists if they permitted themselves to be enticed

much like stupid eighteen-year old Russian girls are recruited into foreign bordellos?

Idle imagination? The present-day heavy-handed government of the Korean People's Democratic Republic for a rather long time has kept the world community in a stressed state, expressing its intention to disassociate itself from the Treaty on Nonproliferation of Nuclear Weapons. The Japanese press reported with concern that in North Korea work was being carried on for the improvement of Soviet missiles supplied in earlier times.

In actuality, the Miass designers supposedly could sketch a more modern charge carrier for their new bosses. Moreover, in the group of departees detained at Sheremetyevo-2 airport, in addition to South Ural scientists, there were those from other regions—specialists in the development of other aspects of strategic armaments.

Alas, the departing "carriers of secrets" did not even conceive of the possibility of such a disclosure. There was no skepticism, only radiant optimism: what was there to fear if they invite you to perform teaching work at a scientific research institute. Naivete?

What is interesting is that not one of them gave the personnel office the true reason for their moving on. One of them spoke of the so-so material situation (and this was absolutely true). Another cited his wavering health. A third planned to move to another city in order to care for aged relatives. Here for some reason or another the "self-survival" instinct was triggered to the fullest degree.

These gray-haired men were not at all wild about those uncertainties which awaited them abroad. It concerned them more that as few as possible here knew about their plans...

Stopped at the entry steps to the aircraft and returning to Miass, most likely they are giving no further thought to a new foreign contract. But the misfortune is that virtually step by step the story of last year is being repeated. The financing of the design bureau is completely unclear. The wages, as before, are less than for their neighbors and from time to time payment is delayed for a week or two.

"A couple of months more like this and we'll begin to run again," reflects Boris Sitkov, who has worked at the enterprise since 1965. "We, who are a little older, will stick it through. But the young people will not put up with this for long. Already, it would seem, this is coming to pass. Many specialists have departed, have taken jobs as ordinary workers. Now the latter are being laid off."

If such a thing occurs, the enterprise can expect a collapse. Fine if a private middle-level enterprise goes bankrupt and collapses: there are plenty of them and no one would take notice. But the unique scientific base of rocket building—is it possible that it has become completely unnecessary to anyone?



It is necessary that the state speak out from time to time. During the past year it was even decided to establish a federal rocket center at Miass! And in general with the signature of the SNV-2 [Strategic Arms Control] Agreement the role of the Design Bureau imeni V. Makeyev is increasing sharply. This is the country's only key organization for building naval strategic missile armaments. And in accordance with the SNV-2 Agreement land developments should yield priority to sea developments, the specific weight of which should almost double.

Alas, all this until now remains only declarations, in no way really backed up and supported by the necessary funds. For the time being no change is being felt at Miass.

"The place of our enterprise has been determined and no one is relieving us of our tasks," says Yuriy Khazov, deputy chief of the design bureau. "But the financing is such that now we simply can pay no one wages."

Will this state approach force scientists to switch to "living off the land"?

Frequently you have the occasion to hear that the way out for defense enterprises is conversion, the output of peaceful products. They say: skillfully and swiftly reorient yourself and you will not be hit by misfortune. Reasonable thinking. But let's recall the clearly expressed specific nature of the design bureau at Miass: rockets, rockets and only rockets! To wait until an unstably glimmering future, again occupied with strategic development work, becomes a reality, meanwhile for a certain time sweating over microwaves and meat choppers—is this the lot of today's scientist?

Yes, the Design Bureau imeni Makeyev, striving to survive, has been forced to some degree to burden its people with the development of conversion products. And we emphasize, scientific development work. But science never and nowhere in the world has ever been profitable. And it cannot be. A profit is obtained only by a producer organizing a production line output of goods. And what does a design bureau produce? Calculations, validations, graphs and sketches. For the time being it cannot be said that these products are competitive on our spontaneously developing market, where food products, clothing, metal, timber and oil are higher in price...

Equipment for the food and food processing industry, oil and petrochemical machine building, medical apparatus, household utensils—these are the general outlines of those directions which the Miass rocket builders are pursuing in attempting to preserve the viability of their enterprise. Thank God, if this activity bears good fruit, it will help in preserving the skeleton of the enterprise. But it will be so difficult to do this because the enterprise here runs into another problem. That is the lack of its own production base.

It would be possible to continue enumerating the misfortunes of the rocket builders for a long time. After all, we have not uttered a single word about how the stream of young specialists arriving at the enterprise after college is completely drying up. Earlier there was an entire system for the training of personnel, including careful competitive recruiting and an ongoing program for the upgrading of working skills. Now there is none of this: young people are simply not rushing to the once prestigious enterprise.

In this tale one would least of all want to stress such concepts as rights and obligations, responsibility to the state for possessing supersecrets. The rocket building specialists did not sit on their suitcases from some desire "to sell out the Motherland." They were seeking an escape from the blind alley into which their enterprise and they themselves had entered.

The people at Miass, however, are not alone in their prolonged desperate situation. Recently the workers of the Russian Federal Nuclear Centers, Arzamas-16 and Chelyabinsk-70, spoke out very clearly about their problems. They can no longer guarantee the country safety because plain and simple they do not have the resources for maintaining the necessary level of production. After all, this is not a shoe factory where a week after a fire the production of goods is again on line. Or even a tractor factory whose production line has finally broken down due to operation at full capacity. Here is a completely different kind of production and if it breaks down this is fraught with with the danger of more than one Chernobyl.

Well, North Korea is not the only country in the world interested in having modern strategic weapons. And it is entirely possible that what did not happen with North Korea may happen with others. Perhaps there will not be Ural rocket builders there, but there will be specialists from other places. And this time will it be possible to stop them as they climb aboard an aircraft? Perhaps this is the only channel along which "brains" can flow?

Accordingly, now it is necessary to think more of the different responsibility of the state to those to whom it has entrusted the possession of supersecrets. The authoritative structures now clearly lack the time for the solution of problems called routine; the wave of political engagement is too high. But, it is true, the problem of the "carriers of secrets"—the "gray matter" of the nation, its strategic intellectual wealth, is such that it must receive the concentrated attention of the high command, the president, the parliament and the government. The situation is such that the loosened bridle at any second threatens to be transformed into a common slip knot; just one more careless movement and then there will be no survival.



### U.S. Companies Eager To Buy Russian S&T Achievements

937A0155A Moscow PRAVDA in Russian  
27 Aug 93 p 3

[Article: 'But They Say That the USSR Was a Backward Country'—first paragraph is PRAVDA introduction]

[Text] The summary of an article from THE NEW YORK TIMES about the hunt of American firms for our scientific and technical achievements and secrets, which was provided with that title and was conveyed via ITAR-TASS channels, was published in PRAVDA approximately two weeks ago. Since then we have repeatedly received from readers requests to print the full text of the article from the American newspaper, which interested many people. Today we are fulfilling their wish.

Washington—Soviet scientists, who worked behind the Iron Curtain, often working in primitive laboratories, struggled with the development of new technologies in medicine, chemistry, and machine building, having fewer means than their western colleagues.

This often forced these scientists to make do with what was available, displaying exceptional creative abilities, which led to the appearance of unorthodox, uniquely economical, or particularly efficient inventions. But, inasmuch as nearly all scientific and other institutes were engaged in military research, many of the most innovative discoveries in the former Soviet Union were considered "top secret," and the West simply never found out about them.

Such was the case until now. And although a significant portion of the potential wealth of the former Soviet Union was inaccessible due to the collapse of its republics, many executives of American companies often fly to Moscow, performing the role of middlemen in order to sell Russian technology to the West.

Several American companies, for example, the American Telephone and Telegraph Company, are applying directly to former Soviet institutes in order to hire their associates. But the very number of such institutes—and there are hundreds of them—is enabling American middlemen to find each one its own niche.

For the Russians these middlemen afford an opportunity to revive science, which is on the verge of collapse now, when the allocations for military research have nearly dried up. For the middlemen Russians afford the opportunity to achieve great success.

"The changes in Russia are creating enormous opportunities for American industry," said Michael Taylor, vice president of one of the largest companies in the field of the transfer of new technologies, East-West Technology Partners Limited, with its headquarters in Washington. "Access to Russian technology affords huge opportunities, but it is quite obvious that we are also dealing with this because it is possible to make money on this."

In spite of the tremendous bureaucratic red tape and the difficulties with the right of ownership, American middlemen are conducting negotiations on the obtaining of license rights in order to sell hundreds of Russian inventions in the United States. These are the treatment of tumors, lithium bacteria, a method of diagnosing precancerous cells, a steel casting process, magnetic welding, ultraviolet sterilizers of medical instruments, and much more.

It is impossible to appraise in dollars this new field, because none of the middlemen has yet sold anything to American industrialists. But several of these firms, for example, East-West Technology and Scientific Dimensions U.S. Incorporated, say that they are on the point of concluding an agreement and by the end of the year will derive a profit from the sale of licenses, as well as the production and sale of products. The potential return, in their words, will be enormous. East-West Technology, which was founded in May, reports that they are on the point of selling to Unisys Corporation a license for an aluminum printed circuit board. Unisys reports that it is still assessing the value of this invention, but representatives of East-West Technology say that this deal, in their opinion, in the end will bring them, perhaps, \$500 million just from the sale of the license. Usually such agreements envisage equal profit sharing with the Russian inventors, moreover, the Americans pay in advance the legal expenses and the expenses for scientific research for patents and marketing.

No one knows how many such intermediary firms are fighting for their own piece of the pie, but such firms, which are most different in size and form, are appearing more and more often.

Major American consulting firms, such as BDM International Incorporated and Kiser Research, where hundreds of scientists and engineers work, are founding joint ventures together with companies, which have been established in Moscow and represent research institutes of the former Soviet Union.

Law firms, which deal with patents, are establishing science divisions to search for technologies in Russia. Independent entrepreneurs are trying to derive a profit, having gotten hold of one or two Russian inventions.

For example, Scientific Dimensions was established in February 1992 by the New York patent law firm of Kenyon and Kenyon, which is now one of its shareholders. This company, which has an office in Moscow and eight Russian patent agents, has already received 280 applications in the United States for Russian technologies, reported its president, Charles Gamer, who goes to Russia once every six weeks.

"There are remarkable inventions," said Gamer, examining the documents on the desk in his office in Lexington, Massachusetts, "a fabric that reflects radiation, cold cathodes for obtaining ions, but there are also completely senseless things, for example, a hair gel and a

lock, which is so large and heavy that, although it is 100 percent reliable, you would never want to use it."

"Very much of what Russian scientists developed," he said, "has disappeared without a trace, because they did not want the West to get this, or this was considered a military secret. Everything connected with space was placed in this category."

As an example he named such an invention as artificial soil, a fabric saturated with nutrients, with which it is possible to cover seedlings in order to promote their growth under the conditions of space.

"How can a transgenetic fish be a military secret?" he said, meaning the work of Russians in the area of genetic engineering. "Because whales, which are fivefold larger than ordinary whales, would result, and they could ram submarines?"

Thus, a search for a vein of gold, which is connected with secret technologies, is under way.

East-West Technology states that it, perhaps, is working such a vein, when it buys the rights to a chemical compound that, in the words of the firm, will kill cancerous and precancerous cells, enabling surgeons to remove a cancerous tumor with absolute precision.

"In surgery in the field of oncology a serious problem is where the boundary between a cancerous tumor and healthy tissue passes," stated company president Arnold Lipman. "The general trend is a radical approach, namely: to remove to be sure as much as possible."

He says that the substance, which was developed by Dr. Viktor Lazerev from Moscow State University, may also change radically cancer diagnosis, by detecting precancerous cells.

This substance, which either is administered as an injection or is taken internally as a tablet, is absorbed by cancerous and precancerous cells. During an operation when exposed to a special light from optical equipment, which was developed by Dr. Lazerev, this substance fluoresces, making it possible to distinguish sick cells from healthy cells.

Precisely such possibilities are prompting intermediary firms to bring together Russian and American companies, which otherwise would never find each other. But first of all the middlemen should be specialists in the area of the legal systems and cultures of both countries in the area of business.

This means to understand patent law, marketing, sales talks, and contracts between corporations. This also means that it is necessary to find in Russia friends and other contacts, who will help to settle the question with the bureaucratic machinery, which remained after 70 years of communism. In many cases this means that it is necessary to find a Russian partner.

That is precisely how matters stood in the case with East-West Technology, which originated when Lipman founded a joint venture with a Russian company that was established by Ye. Velikhov, vice president of the Russian Academy of Sciences and science adviser of President B. Yeltsin.

However, East-West decided that it also needed a third partner, some rather prominent figure, so that the executives of corporations would answer its calls. Therefore, Lipman and Velikhov applied to BDM International and its chairman, former U.S. Secretary of Defense Frank Carlucci.

And still this aspect of the activity—the identification of a technology, the estimation of its market value, and the proposal to prominent American industrialists to buy it—is, perhaps, the easiest part of all this.

"The most serious problem is not to find or to buy, but to determine to whom the right of ownership belongs, that is, to find out who actually owns this Russian technology," Lipman said. American middlemen first of all want, in particular, to find out whether it is possible to patent an invention.

"You begin with a system, in which everything belonged to the government," says Lipman, echoing other Americans who work in Russia. "They can give a scientist an authorship certificate. But this invention belongs to the institute, at which he worked and which was controlled by some specific ministry, therefore, this was property of the state."

The Soviet Union long ago permitted writers and musicians to obtain a patent or copyright for their work. But the first laws in the area of the patent right to technical inventions appeared only in January, and they are not retroactive.

"You should obtain the permission of the institute, at which this scientific associate works," said Lipman. "Then you should apply to the ministry and obtain there the same permission."

"If this proves to be unsuccessful, the government of Russia can grant such a right on the basis of an edict."

Incidentally, in some cases it is impossible to patent inventions made in Russia, because the inventors did not know the norms of international patent law. When in the past Russian scientists came to the West, at times they submitted documents for their inventions or published pamphlets about them and left. But often they did not apply for a patent, which permits their invention to be published. In addition to questions connected with the right of ownership, this technology should have a commercial potential. "We have rejected more Russian inventions than we have selected," said Lipman. "Perhaps, this is big science, but such an invention does not always have a sufficient commercial potential. Or this has already been done here, and the Russians simply do not know about this."

But if Americans are interested, they make an analysis of the commercial potential of inventions. Inasmuch as the Russians do not have hard currency, the American middlemen pay for the patents and marketing. This may prove to be risky, if the license does not pay for itself. But if it does, it can yield a profit for years with negligible costs.

"Such an opportunity never existed before and probably will not exist," said Gamer. "This is like the discovery of Atlantis."

So whose idea is this all the same?

Not only Americans are dreaming about profits from the use of Russian technologies, European and Japanese companies are also hurrying to make a fortune on this....

But the Americans say that it is necessary not only to hurry and to fight rivals, the greatest obstacle is the overcoming of the legacy of the Soviet bureaucratic system and the problem that is connected with the fact that the Russian system has not yet developed new laws and the practice of new business.

#### **Russian Authors Not Compensated for Foreign Publication of Work**

937A0158B Moscow IZVESTIYA in Russian  
3 Sep 93 p 6

[Letter to the editor by Candidate of Technical Sciences A. Idelevich under the rubric "From the Editorial Mail": "Is the Russian Intellectual Property Agency the Protection or the Appropriation of Intellectual Property"?]

[Text] It is considered that the question of the protection of the intellectual property of Russian citizens was settled with the start of payments of "frozen" accounts on 1 July 1993. In reality not everything is that wonderful, a number of problems remain unresolved. I will

cite just a few which concern the relations of the author with the RAIS [Russian Intellectual Property Agency].

First, the VAAP [All-Union Copyright Agency] and its successor, the RAIS, have been grossly violating the rights of the author of publications in Soviet and Russian journals, which are reprinted abroad in full. They do not notify authors of where and when their materials are printed abroad, while they pay the royalties only after application of the author for payment. Thus, I personally did not know for several years that my articles were being reprinted in the foreign press, and, naturally, I did not send applications to the VAAP. When I did send the applications, they notified me that the payment deadline had expired and the money had been transferred to the budget.

Second, payment is made "no earlier than two years after the publication of the last issue of the journal in Russia," but actually three years after. The right to the receipt of royalties is lost four years after the publication of the last issue of the journal, that is, the VAAP-RAIS organized their relations with authors so that the latter can rarely ever receive their royalties.

In my opinion, when reprinting an article abroad, the RAIS should request from the editorial office of the journal the address of the author and should automatically send him the royalties without any applications.

Whereas prior to February 1992 the VAAP still responded to authors' letters, in recent times I personally have not received a response to any of three letters. I do not know the fate of my articles, which were published in journals that have been reprinted abroad, starting in 1989, while the payment deadline expired in 1993.

A question arises: With what is the RAIS all the same concerned—the protection or the appropriation of intellectual property?

[Signed] Candidate of Technical Sciences A. Idelevich  
Chelyabinsk

**S&T Publishers Forced to Seek Customers,  
Handle Own Distribution**

937A162A Moscow *PROMYSHLENNAYA  
ENERGETIKA*, in Russian No 8, Aug 93 p 54

[Article by S. K. Breshin, Chief Editor, Publishing House of Energy, Nuclear Science and Technology Literature (Energoatomizdat), under the title Book Famine, under the rubric CRITIQUE AND BIBLIOGRAPHY]

[Text] Last year the publication of scientific and technical literature decreased almost three-fold. The shelves of bookstores have emptied. There is also no technical literature in numerous book bazaars.

What is going on? Have the publishing houses that produce scientific and technical literature closed? No, practically all the publishing houses are still alive, but the transition to market conditions has proven too severe for them. The publishing houses do not have enough working capital to maintain the publication of literature at the previous level. The unbroken rise in prices for paper, printing and publishing services, transport, etc. has resulted in the fact that the publishing business, which under stable economic conditions was a highly profitable and fast-turnover industry, proved to be too inert under the new conditions, and as a result of the low buying power of the population is simply unprofitable.

The situation has been aggravated by the disorganization of the book trade and its insolvency. Since April, the book trade has been tens of billions of rubles in arrears to the publishing houses, and so far has not been repaying them.

One must, under these conditions, give the leadership of the Russian Federation Ministry of Press and Information [Mininformpechat] their due. They developed the Federal Targeted Book-Publishing Program of Russia for 1993, which includes the publication of educational, reference, scientific and technical, and other literature, within the framework of which the publishing houses

have received a certain amount of financial support; this has made it possible to stabilize the situation to some extent. However, the situation in the book trade remains unresolved. The publishing houses are compelled under these conditions to engage in trade themselves, to make direct contacts with the stores, or to involve the authors themselves for this purpose.

The system of canvassing for orders for literature is changing radically. The usual practice of canvassing for orders with the aid of subject syllabi or through a book-trade bulletin is extremely ineffective under the conditions of continual rise in prices. Therefore a publishing house itself determines, at its own peril and risk, or with the aid of authors, the sizes of print runs, and tries to sell the books from the warehouse or through stores at going prices at the time of the publication of the book. Naturally, the smaller the size of the print run, the higher the price of the book.

What a publishing house intends to publish in 1993 can be found in Book-Trade Bulletin No. 4 (700) of 27 January 1993, where the Federal Targeted Book-Publishing Program of Russia for 1993 for all publishing houses has been published. More precise information specifically in relation to the Publishing House of Energy, Nuclear Science and Technology Literature [Energoatomizdat] can be obtained directly at the publishing house at the following telephone numbers:

235-91-38—sales division;

925-98-35—electrical engineering and industrial electronics editorial office;

925-02-12—electric power and hydroelectric power editorial office;

925-93-50—automation and computer technology editorial office;

921-61-12—nuclear physics editorial office;

921-62-20—heat engineering editorial office.

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